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ABSTRACT

Three factors tend to remove classroom teachers from any direct benefits from formal research: (1) the difficulty of replicating the exact circumstances of the study in the classroom; (2) the scarcity of research which claims to show a "significant difference"; and (3) the complexity of reporting, in formal research journals and reports, which tends to intimidate individuals who lack needed interpretation skills. This paper examines these problems and proposes an approach to dealing with the problems of generalizability of research findings and accessibility of research evidence. It is suggested that laboratory schools are appropriate sites under which to undertake research that can obtain causal evidence of the success or failure of new hypotheses which are directly applicable to the real circumstances of the classroom. It is also suggested that colleges of education maintain a constant emphasis upon the value of the teacher's remaining in touch with current research. (JD)

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GENERALIZABILITY AND ACCESSIBILITY OF CAUSAL EVIDENCE IN EDUCATIONAL PRACTICE

by

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American Association of Colleges for Teacher Education

and

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Educational research is of most value to the practitioner when it offers a clear hope for some improvement of learning in students. However, there are at least three factors which tend to remove classroom teachers from any direct benefits from formal research. First is the scarcity of research which claims to show a "significant difference;" second, the difficulty of replication of the exact circumstances of the study in our classrooms, and, finally, the complexity of reporting of formal research journals and reports which tends to intimidate most educational practitioners who may lack the needed skills of interpretation.

This paper examines these problems and proposes an approach to dealing with the problems of external validity (generalizability) and accessibility of research evidence. The point of view expressed in this paper grew out of wide acquaintance with current practice in teaching in public schools, the frustration of trying to find an organized body of research concerning a single educational problem, and, finally, the conviction that laboratory schools might offer a unique source for attacking the problems described.

Much educational research is concerned with causality - that is, what "causes" learning to occur, whether it be acquisition of facts, understanding of concepts, development of attitudes and behaviors, etc. With this research it is usually desirable to be able to generalize the results of experimentation concerning causal relations to a larger population or to a similar population at a later time. If a curricular innovation can be shown to affect student learning positively in a given setting, one is always hopeful that it can produce a similar result in other settings.

Ennis (3: 6) suggests that causal generalizations may be justified by "derivation" or by "warranted induction." That is, that we can "generalize from one or more specific causal statements, on the ground that the subjects of these statements are appropriately typical of the group covered by the generalization." This kind of generalization is based on what Campbell and Stanley call "external validity" and it has been the subject of much concern and discussion by educational experimenters.

By examining the pursuit of external validity according to the points of view of Campbell and Stanley, Bracht and Glass, and others, this paper will attempt to synthesize these contrasting but similar opinions into an approach that seems to have some merit.

The question to be examined might be stated, "Can specific causal statements of the type '_x_ caused _y_' be expanded into general causal claims, that is, '_x_'s cause _y_'s?" And, obviously we are then concerned with the corollary question, "If so, how?"

It would seem to be an easier task to take the opposite point of view and say that general causal statements can never be confidently arrived at by this method. An explanation of the singular causal claim that "_x_ caused _y_" which means, "_x_ occurred and, in the circumstances, _y_ would not have occurred if _x_ had not," can be used to easily refute this point of generalizability. One need only insist that "in the circumstances" be applied in such a strict way that such circumstances can never be exactly duplicated again. Even scientists, with much more control of their circumstances than educationalists, maintain that their laws apply only to all presently or previously known situations. Future discoveries may make current laws useless just as discoveries in the past have made inapplicable laws previously thought to be true. Certainly if we

think about our own experience, we recognize not only a wide diversity of individuals within our own classes this year, but collective differences in these groups from year to year. These differences are presumably based on some rough estimate of both class means and variability. And so, even if we believe that treatment x caused learning y to occur this time, what confidence can we have that it will happen again? If we turn on a faucet, we have every expectation that water will come out, that is, that turning on faucets causes water to come out. This is true even though most people have at some time had the experience of turning on a faucet and not getting any water. Perhaps the water was turned off elsewhere or a pipe was broken or even frozen, but still we assume that conditions will normally be such that water will come forth. However, because of the variability of educational settings and human subjects we are reluctant to make the same kinds of assumptions about replication of results from similar treatments.

Both Campbell and Stanley and Bracht and Glass have established some extremely confining requirements for external validity. Campbell and Stanley refer to Hume's truism that "generalization is never fully justified logically."(2: 17) They agree, logically, but continue that we do make some qualified guesses and estimates based on empirical observations of our field and the results of previous attempts at generalization. They insist, however, that we employ careful control over a number of variables. Two that will be considered here are control of sampling and experimental control of environment.

Campbell and Stanley are quite concerned with random sampling in order to insure the representativeness of the experimental sample to

the population. Bracht and Glass, on the other hand, are willing to allow generalization even without random selection, to a larger population "like those observed" (quoting Cornfield and Tukey). (1: 441)

We use statistical procedures to try to establish that samples selected for study are representative of our normal population and therefore results can be applied to that population. However, in education, the "subject" is most often an intact classroom rather than an individual student. And how many classroom groups (samples) are truly representative of that normal population? When grouped together totally, students are no doubt "normally distributed" in most respects, but we do not teach entire populations, but rather small samples. If such care must be taken in selection of a sample in order to guarantee its representativeness for validity of selection, must not equal care be taken to find a similar group of learners (classroom) to which we can apply the results of our research? It is doubtful that very many intact classrooms fit the "normal" population of students, and so would not be appropriate groups to whom we might safely apply the generalization from our carefully selected sample.

This fact of educational life (if it is, indeed, a fact) would seem to call for more research directed toward individuals or specified groups of learners. With either stratified sampling or some analysis of treatment effects on individual learners we could, perhaps, distinguish between results with boys and girls, high and low I.Q. or aptitude, or different degrees of student motivation. Whether the evidence concerns teaching materials, process or method, learning modes, teacher/class interaction, or other such factors, its effect can be studied and, where

obviously good or bad results occur, noted.

Such a focus on subsets of the total population would also tend to lessen another major deterrent to the applicability of educational research. That is, the failure to obtain a finding of statistically significant difference. Unless the measure being evaluated is extremely powerful or given a very long chance to act, it is unlikely to affect the total classroom in such a fashion as to significantly alter measures of central tendency. There would seem to be a much greater likelihood of finding an effect on some learners, and identification and description of that group could prove equally valuable.

With respect to the second point of control of experimental conditions, Bracht and Glass suggest that it may be more important to control for this than to control for sample differences (1: 452). They agree that situations probably vary more than individuals from one setting to the next. This point seems valid and yet one of the principal variables in an educational setting must be the experimenter/teacher and that can not be controlled in other situations. And, further, in educational research, because of the importance of interaction among events and elements of events, we are unable to clearly separate causes from conditions or partial causes from the main cause. These difficulties would demand careful description of all aspects of the setting - explicit description of the independent variables (1: 455). Included must be the length of treatment, possibility of novelty or disruptive effects, learning atmosphere of the classroom, teacher's experience with the independent variable, and others.

Based on the above considerations the following proposal is offerred

as a means of approaching causal evidence - experimental or otherwise - that might be of some possible value to the educational practitioner. In education we have either accepted every new idea which has received any kind of promotion - with or without evidence of its value in effecting desirable change - or we have ignored research because it has not "proved" that x can cause y to occur or because x has been so narrowly defined as to seem inapplicable in our situation. Perhaps we might agree to accept research evidence (whether by carefully controlled experimentation or simply observation of what 'works') as tentative support for a hypothesis and try out the hypothesis ourselves, not uncritically accepting it as truth, but always looking for new evidence to either confirm or deny its applicability in this new situation and possibly to modify its claims in the process.

We should allow for a more flexible interpretation of "normal conditions" or "in the circumstances" to encourage further use of research evidence. Controls must certainly be as strict as possible in order to describe what actually happened, but the focus might shift more to a loading of the study to give the best chance for finding significance, e.g. can this treatment bring about a desired change under some conditions or to some of our population. With the use of more complex factorial designs and multiple analysis of variance becoming more common and accessible in educational research (even for the non-sophisticated researcher) it is possible to determine more clearly the interactions referred to above and to identify the parts of the population most affected by the treatment. Replication must be encouraged - even replication in an action setting (classroom) where less control can be

achieved - and reported for whatever value it may be worth. As a small body of such evidence is amassed, it may become clear that the stated hypothesis is being supported in every instance. Or, further replication may tend to dispute the original finding, giving cause to suspect the validity of that hypothesis. It should be apparent that negative findings are equally important as positive support. Seldom does one read a report of an educational project or proposed solution to a problem that failed. Much could be learned from such reporting if conditions that led to the failure can be identified and described.

In order for such an approach to causal research to succeed, at least three conditions must be present. First, someone must be willing to gather the evidence; that is, to think creatively about an educational problem, to try out new ideas in practice, to keep accurate records of the events, and to write up the results. Secondly, there must be a means of disseminating the information which has been accumulated. Someone must collect and publish the tentative evidence which has been gathered in order that it become available for further study and/or use. Finally, these reports must get into the hands of the classroom teacher in such a form that they can (1) be understood by novices in research and (2) be perceived by the teacher as having some practical value, that is, meeting a recognized need of that teacher.

It remains for a plan to be developed which will bring into actuality each of the three conditions just described. This paper will only suggest some possible beginnings, with special reference to the two groups represented in this meeting: the National Association of Laboratory Schools and the American Association of Colleges for Teacher Education.

First, one must identify an initiator for the gathering of evidence. It may well be that laboratory schools offer the single best repository of resources to undertake this task. In 1982, one of the goals identified for helping ensure the survival of laboratory schools in the 1980's was to become more involved in research. Faculty in laboratory schools generally are interested in educational happenings beyond their classrooms and, additionally, have access to the resources of a university's research facilities. Laboratory schools also contain students who represent, collectively, all geographic, economic, social/cultural, and intellectual levels. This should permit the same range of stratification in sampling as a public school population and so make the results of our studies more clearly generalizable. For these reasons it is proposed that laboratory schools become actively involved in initiating a planned and organized program of "evidence gathering" (research, if you will) concerning some well-defined educational concerns.

With respect to the second necessary condition - a channel for communication - the NALS has available both the Journal and the Newsletter as vehicles for internal reporting of evidence. Indeed, the Journal currently features articles describing activities, units, and programs that are considered by individual teachers to be of distinct educational value. It remains only for some expansion and focus to be given to these efforts in order to adequately inform the NALS membership. This does not, however, address the problem of communication with the general teaching population. Whether the needed publication resources to accomplish this task are now in existence or need to be created is a subject which this proposal can not address.

Perhaps the most difficult and controversial condition of this proposal is the last: creating an interest and a willingness on the part

of classroom teachers to become involved in these research efforts. What can be done to stimulate interest in these ongoing attempts at furthering knowledge about our educational situation, even given access to clearly described reports of current research efforts? With the many tasks and problems facing classroom teachers on a daily basis, is there any hope that they can find the time or interest for such esoteric matters as conducting or even taking note of research activities? At this point the Colleges of Education would seem to have a crucial role to play. In both pre-service (undergraduate) and in-service (graduate) education the student must be challenged and encouraged to see the merits of continual involvement in educational research, whether as a practicing researcher or merely a "consumer" of research. This does not call for more research courses, but rather a constant emphasis on the value to the educator of remaining in touch with current research, both formal and informal.

There is a second means by which teacher eduction colleges might become more of a force in productive research. For those schools with large graduate programs, at either the masters or doctoral level, it might be desirable to identify certain areas (questions) for investigation by student researchers. This approach has proven successful in some schools. Graduate students could be encouraged to choose research topics which were directly related to those questions or to replicate previous studies in the area of investigation. This procedure might produce a more worthwhile body of research evidence than the current "scattergun" method of selection of topics.

Finally, how can educators, then, decide when to accept new ideas or suggested causal relationships for their own use without falling into one of the extreme positions referred to earlier ('bandwagon ac-

ceptance or demand for total 'proof')? This is, perhaps, the most basic question for the position presented here of greater emphasis on action research. The only answer to be offerred is admittedly vague. To set up some precise guidelines for either the population to whom the results may reasonably be applied or the degree of success needed to make replication worthwhile only moves us further away from the original thesis. And so, the only answer suggested at the present time is that descriptions of the observed cause and effect relationships (methods and results) should be measured and reported as carefully and precisely as possible - especially with regard to pertinent characteristics of the sample and exact procedures of the treatment - and then the responsibility for deciding on further use rests with the individual reader of the results. If our own learning situation is 'similar' in relevant respects, and if we feel that the reported 'success' is significant, then we may make the decision to try our own replication and use our results to further confirm, modify, or refute the original hypothesis.

These statements should in no way be interpreted as a defense of sloppy research or illogical thought about causal relations. There still is a need for an emphasis on pure research and the best and most carefully controlled work where it can be accomplished. But in education, the greater problems seem to be finding research that claims to make a difference and putting into practice the results of that research. Even the limited evidence we have discovered seems to be mainly left on the library shelves or, perhaps, discussed by graduate students in research courses.

It is hoped that the ideas expressed in this paper will lead to some thought and discussion which might eventually bring about a closer integration of educational research and practice.

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